

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1-17. (Cancelled)

18. (New) A method for generating a concentration gradient in a microfluidic channel comprising the steps of:

providing a microfluidic channel having a first inlet and a second inlet;  
introducing a first fluid containing a diffusible constituent into the first inlet;

introducing a second fluid into the second inlet;

flowing the first and second fluids through the microfluidic channel in parallel laminar flow such that the diffusible constituent diffuses between the first fluid and the second fluid to form a combined solution which has a uniform composition across the width of the microfluidic channel; and

varying the flow rate of the first fluid, the second fluid or both the first and second fluids such that the concentration of the diffusible constituent in the combined solution varies along the length of the microfluidic channel.

19. (New) The method of claim 18, wherein the microfluidic channel further comprises a third inlet positioned downstream of the first and second inlets, and wherein the method further comprises the steps of:

introducing a third fluid containing a particulate material into the third inlet; and

flowing the third fluid through the microfluidic channel in parallel laminar flow with the combined solution.

20. (New) The method of claim 19, further comprising the step of detecting an interaction between the diffusible constituent and the particulate matter.

21. (New) The method of claim 18, wherein the diffusible constituent is a soluble compound.

22. (New) The method of claim 19, wherein the particulate material comprises a biological material.

23. (New) The method of claim 22, wherein the biological matter comprises cells.

24. (New) The method of claim 22, wherein the biological material comprises proteins.

25. (New) The method of claim 19, wherein the particulate material comprises a chemical material.

26. (New) The method of claim 25, wherein the chemical materials comprises reactive beads.